

**Exposure to Mercury in Lahontan Valley Wetlands
Carson River Mercury Site
Lyon and Churchill Counties, Nevada**

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INTRODUCTION

In 1999, the Nevada Fish and Wildlife Office of the U.S. Fish and Wildlife Service (Service) entered into an agreement with the U.S. Environmental Protection Agency (EPA) to assist in evaluating mercury-related risks in the Lahontan Valley, at the downstream end of the Carson River system in western Nevada (Figures 1a and 1b). The objective of this cooperative effort is to identify wetlands in Lahontan Valley where fish and wildlife are at high risk of mercury-related effects. The study consists of two components: 1) Review and interpretation of existing information on mercury concentrations in biotic and abiotic media in Lahontan Valley, and 2) assessment of the biological availability and severity of contamination in major wetlands in Lahontan Valley. This report provides a summary of activities conducted under this agreement during the first quarter of fiscal year 2000.

BACKGROUND

Mercury contamination at the Carson River Mercury Site (CRMS) results from the discharge of liquid mercury imported to the Carson River watershed in the late 1800s to process gold and silver ore mined from the "Comstock Lode." An estimated 7,500 tons of elemental mercury were used in milling operations, and much of this mercury was discarded in mill tailings or discharged to the Carson River or its tributaries in mill effluent. Over the years, the mercury has washed downstream from the former millsites into the middle and lower reaches of the Carson River, Lahontan Reservoir, and wetlands in Lahontan Valley at the terminus of the system. Severe mercury contamination in aquatic sediment and detritus in Lahontan Valley generally correspond to historic Carson River channels, suggesting that mercury was deposited in Lahontan Valley prior to construction of Lahontan Dam in 1915. However, elevated concentrations in Stillwater Point Reservoir, Newlands Project reservoirs, and other wetlands created following regulation of the Carson River indicate that transport and redistribution of mercury has continued since construction of Lahontan Dam and reservoir.

Investigations by the State of Nevada and the Department of the Interior have documented extensive mercury contamination in river channels, marshes, and reservoirs downstream of Lahontan Dam (Cooper et al. 1985; Hoffman et al. 1990; Rowe et al. 1991; Hallock and Hallock 1993; Tuttle et al. 1996, Tuttle et al. in preparation). Highly elevated mercury concentrations have been measured in water, sediment, and biota. Mercury concentrations exceed human consumption guidelines in gamefish and at least one waterfowl species, prompting the Nevada Division of Health to issue consumption advisories beginning in the late 1980's. Previous investigations have not, however, attempted to identify wetlands in the Lahontan Valley at highest ecological risk.

The marsh system in Lahontan Valley is the most ecologically important wetland complex in Nevada, providing habitat for the largest and most diverse assemblage of migratory and wetland-dependent birds in the State (Tuttle et al. 1996). Lahontan Valley wetlands have been designated as one of 14 Western Hemispheric Shorebird Reserves and been nominated for designation as a Wetland of International Importance under the Ramsar Convention. However,

because of uncertainty about future water supplies and concerns about mercury and irrigation drainwater-related contaminants, this nomination has been postponed until these issues are resolved.

Field work carried out through two related EPA Interagency Agreements is also underway. An EPA-U.S. Geological Survey, Nevada District (USGS) agreement calls for the periodic measurement of total mercury and methylmercury loadings at approximately seven locations in the Carson River. The loading measurements will continue until at least early 1999. A second EPA agreement with the USGS Biological Resources Division (Corvallis, OR) is for a study of mercury-related effects in birds at Lahontan Reservoir and Lahontan Valley. The "effects" study began in spring 1997 and continued in 1998. A third agreement is currently being developed between EPA and the USGS-Menlo Park to study the formation and degradation of methylmercury in aquatic sediments in the Lahontan Valley and other portions of the site.

Finally, the Service initiated an investigation of the distribution of mercury in water, soil, and sediment in Stillwater NWR in fiscal year 1999. The Service collected water and sediment samples from each site where aquatic invertebrate samples were collected as part of this agreement. Results for this investigation will be evaluated in conjunction with results of the aquatic invertebrate sampling in Lahontan Valley to assess the relationship between total and methyl mercury in aquatic sediment and biota.

STUDY OBJECTIVES

The objective of this study is to identify wetlands in Lahontan Valley where biota are at high risk of mercury-related effects. The study consists of two phases: 1) Review and interpretation of existing information on mercury concentrations in biotic and abiotic media in Lahontan Valley, and 2) assessment of the biological availability and severity of contamination in major wetlands in Lahontan Valley. The first component includes the compilation of available mercury data and other pertinent information into a single Geographic Information System (GIS)-compatible database. Along with the database, an interpretive report will be prepared detailing the extent of knowledge of mercury contamination in Lahontan Valley and identifying information needs. The second component includes the determination of total mercury and methylmercury concentrations in an organism ubiquitous to all major wetlands and important wildlife areas. Observations of the trophic structure of each wetland will be used to evaluate the potential for mercury to bioconcentrate to wildlife at the top of the food chain.

If warranted, this agreement will be amended next year to include a more intensive study in wetlands posing the highest mercury-related risks. The objective of the more intensive study would be to determine the main source(s) of mercury, and in particular, the mercury subject to methylation and biotic uptake. The data would be incorporated into, and analyzed using a mass balance model of mercury movement. The model would be used to improve our understanding of the sources and movement of mercury in the Lahontan Valley, and help identify and evaluate potential remedial options.